IN THE CLAIMS

1. (Currently amended) A method of centerline determination for a tubular tissue in a medical image data set defined in a data space, comprising:

receiving at least one start point and one end point inside a tubular tissue volume;

automatically determining a path between said points that remains inside said volume;

automatically segmenting said tubular tissue using said path; and

automatically determining a centerline for said tubular tissue from said segmentation,

wherein said receiving, said determining a path, ~~and~~ said segmenting, and said determining a centerline are all performed on a same data space of said medical image data set.

2. (Original) A method according to claim 1, wherein said tubular tissue comprises a body lumen.

3.(Currently amended) A method according to claim 1 ~~or claim 2~~, wherein receiving comprises receiving at most 4 points from a human user.

4. (Currently amended) A method according to claim 1 ~~or claim 2~~, wherein receiving comprises receiving at most 2 points from a human user.

5. (Currently amended) A method according to ~~any of claims 1-4~~claim 1, wherein automatically determining a path comprises determining using targeted marching which uses a cost function incorporating both path cost and estimated future path cost.

6. (Original) A method accord to claim 5, wherein determining a path comprises propagating a sub-path from each of at least two of said received points until the sub-paths meet.

7. (Currently amended) A method accord to claim 5 ~~or claim 6~~, wherein determining a path comprises propagating a sub-path from one of said received points until it meets another of the received points.

8. (Currently amended) A method according to ~~any of claims 5-7~~claim 5, wherein propagating a sub-path comprises selecting a point and selecting a neighbor of the selected point for further consideration responsive to said cost function.

9. (Currently amended) A method according to ~~any of claims 5-8~~claim 5, wherein a path cost of a point is a function of a local cost of a point and a path cost of at least one neighbor of the point.

10. (Original) A method according to claim 9, wherein a local cost of a point is a function of a probability of the point being inside or outside of the tubular tissue.

11. (Currently amended) A method according to claim 9~~ or claim 10~~, wherein a path cost is determined by ~~finding~~ attempting to find at least an approximate solution to an equation including at least one extreme-type function that returns an extreme value of its operands.

12. (Original) A method according to claim 11, wherein if a solution is not found, at least one of said extreme-type functions is replaced by a constant value.

13. (Original) A method according to claim 12, said extreme-type function to replace is found by a min-max method.

14. (Currently amended) A method according to claim ~~9~~11~~-13~~~~or claim 10~~, wherein said equation includes an approximation of a gradient of the path cost.

15. (Currently amended) A method according to ~~any of claims 5-10~~claim 5, wherein a path cost of a point is a function of a probability of the point being inside or outside of the tubular tissue.

16. (Currently amended) A method according to claim 10~~ or claim 15~~, wherein said probability is determined using a histogram of data point values.

17. (Original) A method according to claim 16, comprising updating the histogram when a point is determined to be inside or outside of the tubular tissue.

18. (Original) A method according to claim 16, comprising updating the histogram when a point is selected.

19. (Original) A method according to claim 18, wherein said histogram is updated with a weight corresponding to a probability of the point being inside the tubular tissue.

20. (Currently amended) A method according to ~~any of claims 16-19~~claim 16, comprising generating a local histogram for a part of said vessel.

21. (Currently amended) A method according to ~~any of claims 16-20~~claim 16, wherein the histogram comprises an outside histogram for point values that are outside the tubular tissue.

22. (Original) A method according to claim 21, wherein the outside histogram includes also points inside the tubular tissue.

23. (Currently amended) A method according to ~~any of claims 16-22~~claim 16, wherein the histogram comprises an inside histogram for point values that are inside the tubular tissue.

24. (Currently amended) A method according to ~~any of claims 5-23~~claim 5, comprising selecting a target to be used in an estimating of said future cost.

25. (Original) A method according to claim 24, wherein said estimating is an underestimating.

26. (Currently amended) A method according to claim 24~~ or claim 25~~, wherein said estimating is based on an average cost per distance unit.

27. (Currently amended) A method according to ~~any of claims 24-26~~claim 24, wherein said estimating is based on an Euclidian distance to said target.

28. (Currently amended) A method according to ~~any of claims 24-27~~claim 24, wherein selecting a target comprises selecting from two or more possible targets.

29. (Original) A method according to claim 28, wherein selecting a target comprises projecting two vectors, one for each of two potential targets on a vector connecting a current point with a starting point of the current point and selecting a longer projection.

30. (Original) A method according to claim 24, wherein selecting a target comprises selecting one of said received points.

31. (Currently amended) A method according to ~~any of claims 1-4~~claim 1, wherein automatically determining a path comprises determining using fast marching.

32. (Currently amended) A method according to ~~any of claims 1-4~~claim 1, wherein automatically determining a path comprises determining using the A* path finding method.

33. (Currently amended) A method according to ~~any of claims 1-4~~claim 1, wherein automatically determining a path comprises determining using Dijkstra's minimal length path finding method.

34. (Currently amended) A method according to ~~any of claims 1-33~~claim 1, comprising correcting said determined path.

35. (Original) A method according to claim 34, wherein correcting said path comprising interconnecting path segments.

36. (Currently amended) A method according to ~~any of claims 1-35~~claim 1, wherein said segmenting uses a marching method for segmentation.

37. (Currently amended) A method according to ~~any of claims 1-35~~claim 1, wherein said segmenting uses a contour expansion method.

38. (Original) A method according to claim 36, wherein said marching method assigns a value for each point in said tubular tissue.

39. (Currently amended) A method according to ~~any of claims 36-38~~claim 36, wherein said marching method is a fast marching method.

40. (Currently amended) A method according to ~~any of claims 1-38~~claim 1, wherein said segmenting comprises ~~parametrizing~~ generating a parameterization for points along said path.

41. (Original) A method according to claim 40, comprising propagating said parameterization.

42. (Original) A method according to claim 41, wherein said propagated parameterization is used to prevent leakage of said segmentation.

43. (Currently amended) A method according to claim 41~~ or claim 42~~, wherein said parameterization is propagated substantially parallel to said path.

44. (Original) A method according to claim 43, comprising propagating said parameterization to being substantially perpendicular to a path cost gradient associated with said propagation.

45. (Original) A method according to claim 42, comprising collecting propagation statistics for different parameterization values.

46. (Original) A method according to claim 42, comprising determining a direction of propagation from a propagation of parameterization values.

47. (Original) A method according to claim 41, comprising controlling a direction of propagation based on said parameterization.

48. (Original) A method according to claim 45, comprising limiting propagation of at least one parameterization value based on said statistics.

49. (Currently amended) A method according to claim 48, wherein limiting comprises limiting propagation to be ~~relatively~~ substantially locally uniform ~~volume~~ for nearby parameterizations.

50. (Currently amended) A method according to ~~any of claims 1-49~~claim 1, wherein said segmenting comprises partitioning said path into portions.

51. (Original) A method according to claim 50, comprising defining boundary planes between said portions.

52. (Currently amended) A method according to claim 50~~ or claim 51~~, wherein said portions overlap by a ~~relatively~~ substantially small amount.

53. (Currently amended) A method according to ~~any of claims 50-52~~claim 50, wherein said portions are substantially straight lines.

54. (Currently amended) A method according to ~~any of claims 50-53~~claim 50, wherein said partitioning is used to reduce leakage of said segmentation.

55. (Currently amended) A method according to ~~any of claims 1-54~~claim 1, wherein said segmenting comprises propagating from said path.

56. (Currently amended) A method according to claim 55, wherein said propagating is limited to be substantially ~~relatively~~ perpendicular to said path.

57. (Currently amended) A method according to claim 55, wherein said propagating is limited to be substantially ~~relatively~~ locally uniform in a radial direction.

58. (Currently amended) A method according to ~~any of claims 55-57~~claim 55, wherein said propagating depends on a local curvature.

59. (Original) A method according to claim 58, wherein said local curvature is estimated by counting visited neighbors.

60. (Currently amended) A method according to ~~any of claims 1-57~~claim 1, wherein said segmenting comprises segmenting using a histogram of data values to determine a probability of a point being inside the tubular tissue.

61. (Original) A method according to claim 60, wherein different parts along said path have different histograms.

62. (Original) A method according to claim 61, wherein said histograms are created to vary smoothly between said parts.

63. (Currently amended) A method according to claim 61~~ or claim 62~~, wherein a noise level in at least one of said histograms is reduced using a global histogram.

64. (Currently amended) A method according to ~~any of claims 60-63~~claim 60, comprising repeatedly updating said histograms during said segmenting.

65. (Currently amended) A method according to ~~any of claims 1-64~~claim 1, comprising cleaning the segmentation.

66. (Currently amended) A method according to ~~any of claims 1-65~~claim 1, wherein determining a centerline comprises generating a distance map of said tubular tissue, of distances from an outer boundary of said tubular tissue, inwards.

67. (Original) A method according to claim 66, wherein generating a distance map comprises using morphological skeletonization on said segmentation.

68. (Currently amended) A method according to claim 66, wherein ~~determining~~ generating a distance map comprises using fast marching on said segmentation.

69. (Currently amended) A method according to ~~any of claims 66-68~~claim 66, wherein determining a centerline comprises finding a path in said distance map.

70. (Original) A method according to claim 69, wherein finding a path for said centerline comprises targeted marching from at least one end of said segmentation.

71. (Original) A method according to claim 70, wherein said targeted marching for finding a path comprises taking a local curvature into account.

72. (Currently amended) A method according to ~~any of claims 1-71~~claim 1, wherein said data set is three dimensional.

73. (Original) A method of segmenting an organ in a medical image data set, comprising:

dividing said data set into portions; and

using a different probability histogram in each of at least two of said portions for determining if a point belongs in the segmentation.

74. (Original) A method according to claim 73, comprising smoothing at least two histograms, for two neighboring portions.

75. (Original) A method according to claim 74, wherein said smoothing comprises registering a plurality of points in both of said neighboring histograms.

76. (Currently amended) A method according to ~~any of claims 73-75~~claim 73, comprising correcting said different histograms using a global histogram that encompasses at least two of said different histograms.

77. (Currently amended) A method of segmenting an organ in a medical image data set, comprising:

defining a plurality of partially overlapping portions in said data set, which portions cover at least one object of interest;

separately segmenting each of said portions; and

combining said segmentations to yield a single segmentation of said at least one object of interest.

78. (Original) A method according to claim 77, wherein said portions are selected to divide a tubular organ into substantially straight sections.

79. (Original) A method of segmenting an organ in a medical image data set, comprising:

propagating a segmentation in said data set; and

applying a curvature limitation to said propagation.

80. (Original) A method according to claim 79, wherein applying a curvature limitation comprises counting visited neighbors.

81. (Original) A method of propagating parameterization in a medical image data set, comprising:

providing an initial parameterization in said data set along at least one line;

propagating a parameterization from said line, wherein said propagation is limited to being substantially parallel to said at least one line.

82. (Original) A method according to claim 81, comprising propagating said parameterization to have a gradient which is substantially perpendicular to a gradient of a path cost associated with said propagation.

83. (Currently amended) A method according to claim 81~~ or claim 82~~, comprising limiting an angle between (a) a spatial vector defined between a starting point of the parameterization along said line and ending at a current point of propagation of parameterization and (b) said path, to being close to perpendicular.

84. (Original) A method according to claim 83, wherein said limiting comprises reducing leakage of a segmentation by said limiting.

85. (Currently amended) A method according to ~~any of claims 81-83~~claim 81, wherein said medical image data set is a three-dimensional data set.

86. (Currently amended) A method of ~~centerline~~ path finding in a distance map, comprising:

providing a distance map of an organ having a centerline;

determining a desired tradeoff between curvature of a path and (a) local curvature of a path and (b) a path remaining near said centerline ;and

finding a path in said map while applying limitations of (a) local curvature of the path and (b) the path remaining near said centerline,

wherein said finding a path comprises applying said trade-off in a manner which is uniform at points along a path in organs having cross-sectional areas different from each other by more than 50%.

87. (Original) A method according to claim 86, wherein said limitations are applied as part of a targeted marching method in which a path is found by propagation of wave front using a cost function which depends on both a local cost and an estimated cost to target.

88. (Original) A method according to claim 87, wherein said trade-off is applied to at least two points in a same organ.

89. (Original) A method according to claim 87, wherein said trade-off is applied to two different organs in a same data set.

90. (Currently amended) A method according to ~~any of claims 86-89~~claim 86, wherein applying said tradeoff comprises using a formula for trading off which includes an exponent and normalization of organ diameter.

91. (Currently amended) A method according to ~~any of claims 86-90~~claim 86, wherein said tradeoff is uniform on different parts of a cross-section of said organ over a range of at least 50% of said cross-section, such that same movement has a similar effect on curvature.

92. (Currently amended) A method of centerline determination for a body tubular tissue in a medical data set, comprising:

providing a data set ~~including~~ representing a tubular tissue having n points in a three-dimensional medical dataset; and

finding a path in said data set in O(nlogn) time of scalar_ calculation steps.

93. (Original) A method according to claim 92, wherein said path is found using no more than O(n) memory units.

94. (Original) A method of centerline determination for a body tubular tissue in a medical data set, comprising:

providing a data set including a tubular tissue having n points in a three-dimensional medical dataset; and

finding a path in said data set using no more than O(n) memory units.

95. (New) A method according to claim 15, wherein said probability is determined using a histogram of data point values.